

WHAT IS CLAIMED IS:

1. A control apparatus for an internal combustion engine, comprising:

a supercharger connected to an intake passage of the internal combustion engine and driven by a motor;

5 a bypass passage which is provided for the intake passage in such a manner as to bypass the supercharger;

a flow amount adjustment device which arbitrarily adjusts a flow amount of air flowing through the bypass passage by being driven electrically;

10 an operational state detection portion which detects an operational state of the internal combustion engine; and

a driving time decision portion which decides a time at which the flow amount adjustment device is driven, based on a result of detection performed by the operational state detection portion.

15 2. The control apparatus according to claim 1, wherein the operational state detection portion determines whether an amount of intake air flowing through the supercharger becomes equal to an amount of intake air flowing through the bypass passage, and the driving time decision portion starts to drive the flow amount adjustment device so as to close the bypass passage when the amount of intake air flowing through the supercharger becomes equal to the amount of intake air flowing through the bypass passage after
20 supercharging by the supercharger is started.

3. The control apparatus according to claim 2, wherein the operational state detection portion determines that the amount of intake air flowing through the supercharger becomes
25 equal to the amount of intake air flowing through the bypass passage when a rotational speed of the supercharger reaches a predetermined rotational speed.

4. The control apparatus according to claim 3, further comprising an intake air amount detector that detects an intake air amount on an upstream side of the bypass passage,
30 wherein the predetermined rotational speed is decided based on the intake air amount detected by the intake air amount detector.

5. The control apparatus according to claim 3, wherein the operational state detection portion detects an engine speed and an engine load of the internal combustion engine, and

the predetermined rotational speed is decided based on the detected engine speed and the detected engine load.

5 6. The control apparatus according to claim 2, wherein the driving time decision portion drives the flow amount adjustment device so as to close the bypass passage immediately after the supercharging by the supercharger is started in a case where the amount of intake air flowing through the bypass passage is equal to or smaller than a predetermined value when the supercharging is started.

10 7. The control apparatus according to claim 2, wherein the driving time decision portion drives the flow amount adjustment device so as to decrease the amount of air flowing through the bypass passage gradually or stepwise until the bypass passage is completely closed after the supercharging by the supercharger is started.

15 8. The control apparatus according to claim 7, wherein the flow amount adjustment device includes a valve which opens and closes the bypass passage, and the driving time decision portion decides a speed at which the valve is closed, based on an actual rotational speed of the motor and the predetermined rotational speed.

20 9. The control apparatus according to claim 2, further comprising controller that controls the motor for the supercharger, wherein the controller gradually increases the rotational speed of the motor until the bypass passage is completely closed after supercharging is started.

25 10. The control apparatus according to claim 1, further comprising a variable geometry turbocharger which is provided on a downstream side of the supercharger connected to the intake passage; and a control portion which controls an area of an inlet opening portion through which exhaust gas flows into a turbine of the variable geometry turbocharger, wherein the control portion prohibits the area of the inlet opening portion, through which
30 exhaust gas flows into the turbine, from becoming minimum when supercharging is performed using the motor.

11. The control apparatus according to claim 1, wherein the flow amount adjustment device is provided in the bypass passage at a portion on an upstream side of a portion at

which the intake passage and the bypass passage are combined.

12. A control method for an internal combustion engine which includes a supercharger and a bypass passage which is provided for the intake passage in such a manner as to
- 5 bypass the supercharger, comprising:
- detecting an operational state of the internal combustion engine; and
 - deciding a time at which the bypass passage is closed, based on the detected operational state.